SUPPLEMENT.

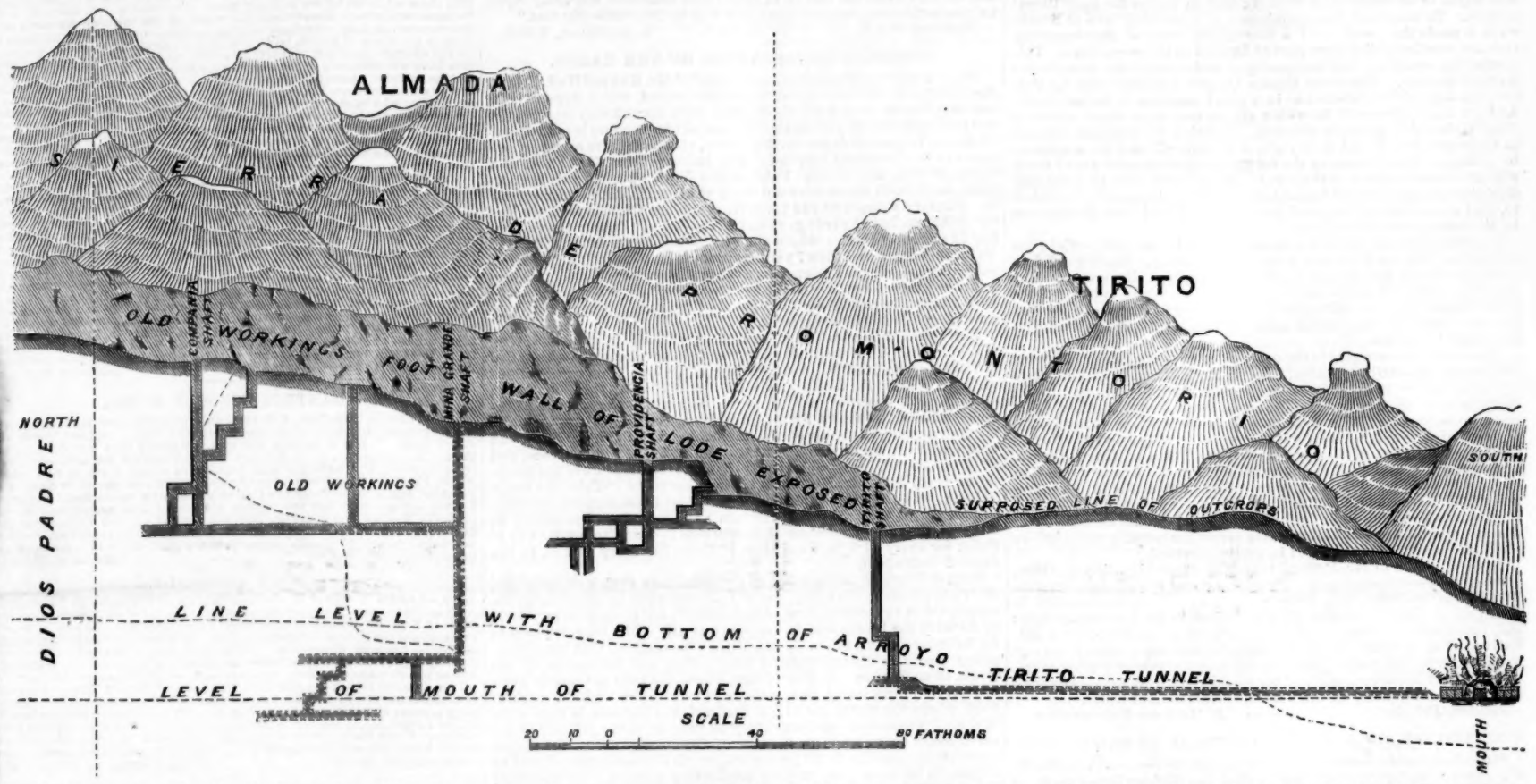
The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

No. 1799.—Vol. XL. LONDON, SATURDAY, FEBRUARY 12, 1870. {STAMPED .. SIXPENCE. UNSTAMPED. FIVEPENCE

MINING ENTERPRISE IN NORTHERN MEXICO—THE ALMADA AND TIRITO MINES.



We take pleasure in calling the attention of the public to the prospectus of the ALMADA AND TIRITO CONSOLIDATED SILVER MINING COMPANY (Limited), which appears in another column, and also to the above section, describing the position of the property. The Almada Mines were contracted for in 1866, and recently purchased by the Almada Silver Mining Company (Limited). The upper workings in them have produced to the Almada family about $4,000,000, or 800,000*l.* The value of the property is corroborated by Col. Bourne, an English engineer of eminence, who visited these mines in 1827, and from whose information on this subject Mr. Ward, Her Britannic Majesty's then Charge d'Affairs in Mexico, gives full particulars, *vide* Appendix to his work on the Mineral Wealth of Mexico.

It appears that at a subsequent date, and after the mine had been worked to a depth of about 50 fms., the ores assumed a refractory character, the treatment of which at that time was not understood, and the lower levels were, in consequence, abandoned, and the upper portion of the mine dispillared when the rich docile ores left there were taken out. (See plan.) In the meantime, the lower levels filled with water, and from the absence of pumping machinery, Mr. Almada was compelled to relinquish the work, although he found at a later date that by calculation these rebellious ores were reduceable.

Mr. Almada then commenced to work the Providencia Mine, and had got to its present depth when the French intervention occurred, and political influences compelled him to retire from Alamos to Guaymas, and at which latter point the purchase was conditionally made from him of this valuable property—the Almada Mines—embracing the mines Compania, Minor Grande, and Providencia, with about 20,000 acres of land, and the port of Agrabampo, on the east of California. The modes of treatment of these rebellious ores is now well understood, and the difficulties experienced by Mr. Almada no longer exist. The lode in the bottom levels is stated on reliable authority to be 40 ft. wide, all in ore, and the produce is ascertained to have been 50 ozs. and over to the ton. The Tirito Mine immediately adjoins the Almada (*vide* plan) Mines on the south, and has been worked by means of a tunnel driven 1081 ft. in porphyritic rock, when it cut the lode, which is proved by actual survey of the engineer in charge of the Almada Mines to be 123 feet wide. When the purchase of this mine was made the ventilation shaft was not holed through, consequently but little work could be done in the tunnel on the vein, and at this juncture the purchase of the mine was effected. Shortly after the ventilation was accomplished, and the results can be appreciated on reference to the reports and letters in our issue of this date. Since the prospectus was in print, later advices, up to December 8, have been received, and which show conclusively the immense value of the purchase, and the advantages of amalgamation to both properties, as the adit will drain the whole of the mines, without the aid of pumping and other expensive machinery, to a depth of about 80 fathoms.

A tramway will convey the ores from the different levels through the adit to the reduction yard, where already everything is in order to receive as many stamps as may be needed; at present only ten are in operation, but from the ore in sight (see Messrs. Breach and Frill's letters) at least thirty or fifty additional stamps will soon be required. The lode in the Tirito is a gigantic one, measuring 123 ft. in width, and which is more fully described in Mr. Breach's reports; and from those lately received there can be little doubt of immediate returns coming forward, and later on very rich ones may be expected. We look upon this as an immediate dividend-paying concern, and which may be increased to almost any degree, depending on the quantity of stamping power put up, and which fortunately can be obtained at San Francisco in a comparatively short time. The company have been most fortunate in securing the services of Mr. John P. Clemes as engineer and manager in chief at the mines, and who is now on his way out to take charge; he sailed on January 22.

Mr. Clemes recommended the Almada Mines for purchase originally, and afterwards visited Real del Monte and other mining districts in Mexico, as well as California, and his letter, annexed, shows his opinion of the property, and it would not surprise us to see the Almada and Tirito Consolidated Silver Mining Company (Limited) attain the high prestige of Real del Monte, or even the Comstock lode, which latter it resembles very much in some of its best features. The advantages claimed for the present company are, doubtless, of much importance. Proximity to the coast, good roads, cheap labour, no water to contend with that requires expensive staff and machinery, a porphyry country with hard rock, consequently but little timber required, no large quantity of mules wanted, and provisions cheap and abundant. The amalgamated companies are entitled to about 4000 ft. on the gigantic lode, which should be a guarantee that dividends must not only come soon but last a long time.

Since the prospectus (which appears in our advertising columns) was printed the following satisfactory intelligence has been received:

Promontorio, Dec. 8, 1869.—Last week I went all through the workings of the Tirito Mine. In the south level they have driven 130 ft. from the tunnel. The face of the work is 20 ft. in width, and nearly, or quite, as high, all in ore, the vein of which has continued the same size the whole distance. The floor and roof of the level is ore throughout. The north level is driven 112 ft. from the tunnel, and is in ore throughout its extent. The vein in this level is only 13 ft. wide, but at the face is widening, and will soon equal the width of the southern level. From the air-shaft levels are being run in the same vein of ore they are driving on in the tunnel levels. The ore to the south has for some time past been improving in quality, while that to the north remains at its original ley of about $50 per ton, but as all the ore is crushed together it is impossible to judge of the difference. To sum up a report on the Tirito in one sentence, it is impossible to find a mine that looks better. Of course, there are richer mines, but the enormous quantity of ore in sight will make it compare favourably with any mine. On Nov. 20 two tortas were washed up, estimated to contain 13 tons each, the yield per Mint return was $2180 (equal to $84 per ton), besides some ounces in the slag, which the Mint returns to be cleaned here. The supposition is that some rich ball of metal was cut in the mine, and that it all went into the 26 or 27 tons. Since then none has been washed, owing to the heavy rains, which lasted a whole week. The yield for some little time has been from $58 to $65 per ton, and seldom below $60. At present there are 12 tortas on the patio. Mr. Frill only estimates them to yield $700 or $800 each, but I believe they will exceed that amount, as the metal lately has looked better than it ever did.

Promontorio, Dec. 1, 1869—Extract from Mr. Frill's letter.—I will have available means (on Jan. 1), over and above all expenses paid, and all debts paid, the mine fully opened, the air-shaft completed, a first-rate engine and boiler complete, and the mill in splendid running condition, the patio and lavadeiros finished, and the whole patio covered with metal sufficient to meet my predictions on Jan. 1, say all debts paid, and $10,000 in hand, and you must not feel surprised if I produce double the amount of profit by that time, say $20,000. . . . . Now, with the mine fully opened, splendid ventilation, the mill in excellent running order (since Nov. 9), the patio full and complete, the lavadeiro complete, plenty of supplies and material, it is more than fair to compute double the quantity mined and beneficiated in the next six months, say to July 1, consequently double the amount of profit made in the last six months must be the result.

MANUFACTURE OF IRON.—The heat imparted to the materials in the calcining process is taken advantage of in the invention of Mr. R. BROWN, of Glasgow, and the materials are transferred to the smelting furnace as soon after the completion of the calcining process as it is possible or convenient to carry them from the heaps to the furnace, and in all cases before the calcined materials become cool enough to absorb moisture.

MINING, METALS, AND MINERALS—PATENT MATTERS.

BY MICHAEL HENRY,
Patent Agent and Adviser, Memb. Soc. Arts, Assoc. Soc. Eng.

Mrs. ANN BROOMAN, of Camberwell, widow, and sole administratrix of the late Mr. C. E. Brooman, of Fleet-street, has obtained a patent for the construction of boilers and furnaces for generating steam and for economising fuel (communicated to the said Mr. C. E. Brooman from abroad by Mr. Elijah Weston, of Buffalo, in the United States). The first part of this invention consists in the employment of vertical partitions in the water spaces surrounding the fire-box, in order to effect a quicker and more extensive generation of steam, and to produce a perfect circulation of the water therein. The partitions are preferably placed close to the sides of the fire-box, so as to leave a larger space between them and the outside skin than between them and the fire-box. The top and bottom of the partitions are open, to allow a free passage to the water around them; and as the steam is more rapidly generated next the fire-box, the weight of the water in the larger space on the opposite side of the partition keeps up a constant circulation of the same. The second part of the invention consists in forming a gas and smoke combustion chamber in the rear of the fire-place, by extending the crown-sheet of the fire-box, and by fitting a partition or bridge to close the opening, except a narrow space at the top for the passage of the flame. The third part of the invention consists in the employment of graduated horizontal openings in the furnace-door, the openings being covered by a screen of wire-gauze, through the meshes of which the air rushes in finely subdivided jets, and passes over the fire. The largest of the openings is preferably at the bottom of the door. It is not intended to restrict or confine the invention to locomotive boilers only, as in many cases it may be found of great service in marine and other boilers.

Mr. JOHN STRINGFELLOW, of Chard, Somerset, has specified an invention relating to apparatus for affording protection from bullets and other missiles. This invention consists of a shield or plate and a hand vehicle combined. The shield is formed with eyes or socket adjustable at the back, to attach it to the front of the vehicle, to facilitate its being supported and carried on the same, and admit of its being set at any angle, in order that the bullets or other missiles shall glance off when they strike; it can be pierced with apertures at its upper part, for the muzzles of rifles to be put through, so that the party using the apparatus can fire upon the enemy without danger of being hit himself. The vehicle may be mounted upon two or more wheels, and can be made of sufficient width to protect two or more men. Ammunition can be carried in the body of the vehicle as well as breech-loaders or other arms, and in some cases a small field gun may be carried on the vehicle. The shield can be adjusted and balanced on the vehicle, so that when struck it may yield slightly to the percussion, and thus reduce the force. Other apertures may be made in the shield a little below the centre, for the muzzles of rifles to be put through, and when larger guns are used it is preferred to mount them on the carriage behind the shield.

NEW BLASTING POWDER.—Mr. C. W. OLIVER, of Liverpool, has patented an invention which relates—firstly, to a new and improved manufacture of explosive powder suitable for blasting purposes, the advantages of which are that it is stronger, and can be made with perfect safety and more cheaply and rapidly than the ordinary powder now manufactured; secondly, to an improved machine to be used for combining and incorporating the ingredients of the powder, and also for granulating the powder when the ingredients are incorporated.

ARTIFICIAL FUEL.—An invention was provisionally specified through Mr. WISE, but not proceeded with, for distilling mineral and vegetable tars, and combining their residual products with coal dust, to form rocky masses of fuel without pressing, and in the apparatus for that purpose.

TREATING MINERAL OILS.—The essential feature in the invention of Mr. W. SMITH, of Bathgate, consists in employing the acid diluted with from one-half to twice its volume of water, the acid and water being mixed with the oil whilst in the heated state, produced by their combination, so as to avail of the heat developed.

Original Correspondence.

THE PRESENT AND FUTURE OF OUR WORKING MEN.

SIR,—I have been hoping from day to day to be able to send you the letters I projected, reviewing the interesting communications to your columns last year on the subject of Slate. But I have been too busily engaged to give the time the subject would require to go into it properly; and my design, not forgotten, must wait for a period of more leisure. Meantime, I am tempted by the continual cropping up of events and topics of much interest as bearing on the condition of our working classes to send you a few remarks on the aspect of their affairs at the present time.

My forecast of the consequences of the timidity of the leaders of Trades Unions in not taking at once a bold uncompromising stand in denouncing coercion of non-Unionists in every form and shape has been fulfilled to the letter. They have lost their power as guides of the great movement now in progress for dealing with Trades Unions to make them really beneficial to working men and useful to all classes of society. This power has passed into the hands of the enlightened leaders of the liberal party, as will be shown as soon as Parliament meets. Mr. Potter's fainthearted denunciation of such practises has had the usual fate of all disclaimers with bated breath, made at the wrong time. When pushed to the wall he could find no defence for intimidation, but dared not take such bold measures as would have forced the Unions to clear themselves before the world from all participation in illegal violence. So when Trade Unions should have been educated up to the point of giving up this wrong doing really and in earnest in word and deed, finding he cannot run with the hare and hunt with the hounds, he drops the subject like hot iron, and goes in for emigration. Meantime, the neighbourhood of Sheffield keeps up its bad fame as the scene of outrages and violence; and the engineers of Greenwich follow suit, if not in the same degree of crime, at least with such breach of the law as sends some who ought to be respectable working men to prison for their illegal actions. To crown all, the candidature of a working man at Southwark is made the occasion of a disgraceful scene of electioneering violence, worthy of the worst part of Ireland in the worst times. This is what the weakness and incapacity of their leaders has brought the working men to. Whenever Trades Unions are dealt with by Parliament they will be treated as in a great measure to be put down. And put down they will be with a strong and high hand, as far as their violent doings are concerned. Coercion of free men, entitled to their own free use of their right of labour, will not for a moment be endured. The Unions, in the face of the glaring evidence of facts, will no longer be taken at their words, or believed when they say they disclaim persecution and intimidation. Their doings will be looked to, and ample security exacted for the sincerity of such disclaimers by the strong arm of the law.

In some other respects the progress of sound sense and truth in the councils of the working men is more satisfactory. Much good doctrine has found acceptance in the Birmingham discussions. The specious fallacy of reciprocity opposed to free trade is borne down on all hands by facts and figures, and working men begin to see that for every market they would open by loading imports with duties they would close five.

Especially encouraging is the growing conviction that in improved education (especially technical), not in any attempt to oppress competitors, the true secret lies of our country keeping the lead in the manufactures of the world. The great truth I have so often dwelt upon in these pages is forcing its way to the surface—that Trades Unions, in confining their efforts to keeping up wages, have neglected their main function of keeping up the excellence of English work, and that our great loss of foreign markets has often been a question of *quality* even more than of price. For this decline in the supremacy which gave us a *prestige* the masters are as much to blame as the workmen—fixing their eyes on prices and profits as selfishly as the men did on wages. Unless these errors are speedily amended we shall lose more trade than will be easily regained.

In my allusion to Mr. Potter's taking up the emigration question, I must not be supposed as in any way opposed to judicious emigration of the working class, which I have so often recommended in your pages. Its advantages are too obvious to need advocacy here; but, important as it may be as a measure of relief, it is only a palliative. The effectual means of finally removing distress from our working men, and making them really and permanently prosperous, will be found in our command of the world's markets, secured by such excellence and honesty of work as our rivals cannot equal.

London, Feb. 5. A MAN OF EXPERIENCE.

PROBABILITY OF A NEW COAL FIELD IN SHROPSHIRE.

SIR,—Since addressing you on the subject of the North Staffordshire mines, and giving my opinion that the borings being made at Child's Ercall would, in all probability, show the depth to be but moderate down to the "Top Red Mine," a friend has lent me the last of the "Memoirs of the Geological Survey," just published, containing the researches of Mr. Hull, district surveyor, in connection with the Government Survey, in the Triassic and Permian rocks of the Midland Counties of England. Mr. Hull is a weighty authority on the subject on which he writes, having made these red rocks, the cost of sinking through which has hitherto deterred proprietors and speculators from making experiments, his special study. In looking at the results of his investigations—investigations carried on during several years in Staffordshire, Cheshire, and neighbouring counties—it is gratifying to find that they harmonise with the conclusions arrived at from a more limited experience, which I have stated here and elsewhere, in my reports of the Ercall borings. There is, therefore, every reason to look forward to the time when operations on an extended scale will take place, and a new coal field will be opened up near Market Drayton. Speaking of this tract of country, Mr. Hull says the Permian beds rest with a slight amount of discordance upon the Upper Coal Measures from Audley, on the north-west, to Blurton, near Longton, on the south-east, forming a band of country of varying breadth by Madeley, Keel, Newcastle, to Barlaston, near Stone. From Madeley they also stretch southward for several miles to Great Bolas, in Shropshire, being brought to the surface along the line of a large fault near Cheswardine, which ranges in a north-north-east direction. A fine section of these beds, consisting of red and purple sandstones and marls, is laid open in the canal section near Cheswardine, together with the eastern boundary fault, which introduces the conglomerate beds of the New Red Sandstone.

On considering the relations of the Permian beds to the coal measures along the southern and western margin of the coal field, we find there is a steady dip of the two formations in the same general directions; and at Newcastle, Clayton, Hanchurch, and Trentham, where the Upper Coal Measures are brought to the surface by faults, this fact is equally apparent. It is *clear, therefore, that the whole of the coal beds underlie these Permian rocks;* and as their greatest thickness does not exceed 600 ft., and that of the Upper Coal Measures 1000, the depth to the "Red Shag" or the "Bassy Mine" ironstones would probably not exceed 600 or 700 yards *over any part of the ground occupied by this formation, and over much of it would be considerably less.* With such rich and valuable beds of ironstone and coal as this district contains, it is satisfactory to know that there is a large area of productive ground still unbroached.

Mr. Hull says it is probable that the greatest thickness of these rocks does not exceed 600 ft., and that the depth to the Bed Shag or Bassy Mine would, probably, not exceed more than 600 or 700 yards over any part of the ground occupied by this formation, and over much of it it would be considerably less. We had put the depth at the Ercall borings down to the Top Red Mine at 665 yards. The red shag is about 47 yards lower down, and the Bassy Mine 18 yards lower still, which makes 65 yards additional, or 730 yards altogether. But this additional thickness at Child's Ercall is accounted for by the presence of a bed of lower mottled sandstone, which overlies the Permians at the point where the borings are being made, and which thereby adds to the thickness of the rocks to be bored. There is, too, something remarkable in the section of the lower mottled sandstone at Child's Ercall, as the borer brought up pebbles out of the sandstone long after there appeared reason to believe that the usual pebble-beds had been left behind. Mr. Hull thinks the thickness of this subdivision would be from 70 to 80 feet; and supposing it to be the former, and we deduct this 70 of lower mottled sandstone from the above 730 yards, we get 660 yards, which comes within 5 yards of the depth we had given for the borings. But, as we showed in the *Mining Journal* at the time, several hundred feet of red rocks, indeed, the whole of the pebble-beds and mottled sandstone of the Bunter might have been escaped, by selecting a spot not a mile distant, where the Permian rocks appear at the surface, but there are various points, and those in better situations for sinking, as, for instance, close to the canal, and much nearer to the railway and to Market Drayton, where not the mottled sandstone of the Bunter merely, but *where much of the upper Permian sandstone itself* might be escaped, and the rich workable coal measures reached, at not more than half the distance down.

With the Shropshire coal field exhausted, and three-fourths of the proprietors of mines at their wits ends to know what to do for mines, and proprietors of estates, we doubt not, willing to lease at a reasonable royalty their property for mining purposes, there is a legitimate field open for profitable enterprise, and the wonder is that it has not been taken up before. Mr. Hull mentions an interesting section in the canal west of Cheswardine, where, walking from Stoney Ford southwards, the marls and sandstones of the Permians are visible for more than a mile, till they terminate in a fault, which brings in the conglomeratic sandstone of the Bunter; and that at a point in the centre of this anticlinal, at a distance of 300 yards from the New Red Sandstone fault, a locality appears to be offered where a coal shaft might be sunk with the expectation of reaching the coal at a less depth than 1000 ft. "As in walking from Stoneyford," he says, "we are continually passing into lower beds, we may suppose that at this point the beds are not very far from the base of the Permians. If we allow an additional 200 ft. as the depth of the coal measures below the canal, this added to the 300 ft. (the thickness passed over in the distance to Stoneyford), we shall have 500 ft. for the whole thickness of the Permian, about equal to its greatest amount along the borders of the South Staffordshire coal field. And, on the supposition of an additional 600 ft. of upper coal measures, the total depth to productive measures at this point will be 200×600=800 feet."

Madeley, Feb. 7. J. RANDALL, F.G.S.

INTERNAL TEMPERATURE OF THE EARTH.

SIR,—The particulars given in the paper of Mr. Edward Hull, F.R.S., the director of the Geological Survey of Ireland, which appeared in the Supplement to last week's Journal, were remarkably interesting, but tend rather to show that the increase of temperature is not regular in descending towards the earth's centre, although there certainly appears to be a constant increase. The increase from 64½° Fahr. at a depth of 161 yards to 93½° Fahr. at the depth of 808 yards is enormous, and depth alone does not seem at all sufficient to account for it. Thus, at a depth of 748 yards from surface the temperature was 89° Fahr., and at 14 yards gave an increase of 1½° Fahr.; the following 12 yards, 1° Fahr.; whilst the succeeding 27 yards gave but 1½° Fahr. increase; and then 7 yards gave an increase of ½° Fahr. Now, such discrepancies as these render averages based upon the figures perfectly worthless, because if the increase be so extremely irregular it would be quite justifiable to conclude that at some comparatively small depth it ceases altogether.

From observations taken at the Dukinfield Colliery, by Messrs. Wm. Hopkins and W. Fairbairn, it was estimated that the increase equalled 1° Fahr. for about 65 ft. Prof. Phillips, of Oxford, from observations at Monkwearmouth Colliery, estimated it at 1° Fahr. for each 61½ ft.; and Mr. Hull observes that, in order to obtain the average rate of increase of heat, as shown by the experiments at Rosebridge Colliery, we may assume, in the absence of direct observation, the position and temperature of the invariable stratum to be 50 ft. from surface, and 50° Fahr., which is probably nearly the mean temperature of the place. Using these data, Mr. Hull finds the increase to be 1° Fahr. for every 54½ ft.; yet he admits that if, for the purpose of comparison, the measurements for the invariable stratum as obtained at Dukinfield be adopted, the rate of increase at Rosebridge is found to amount to 1° Fahr. for every 47·2 ft., as against 1° Fahr. for every 83·2 ft. in the case of Dukinfield.

Such differences as these are so extraordinary that, accepting Mr. Hull's conclusion that they are not attributable to inaccuracy, the only opinion that can be formed is that depth has comparatively little to do with the increase of temperature at all. This view appears to be, to some extent, taken by Mr. Hull, who suggests that the discrepancy is due to dissimilarity in the position and inclination of the strata in each case. At Rosebridge, where the beds are nearly horizontal, the increase of temperature is very rapid, whilst at Dukinfield, where the strata are highly inclined, the increase is very slow. Mr. Hull assumes a constant supply of heat from the interior of the earth could only escape in the case of Rosebridge across the planes of bedding, meeting in its progress upwards the resistance offered by strata of, in each case, varying conducting powers. On the other hand, in the case of Dukinfield the internal heat could travel along the outcrop of the beds. He offers this suggestion as explanatory of the results under consideration, and remarks that the strata at Monkwearmouth Colliery, the thermometrical observations at which correspond so closely with those obtained at Rosebridge, are also in a position not much removed from the horizontal, which appears to favour Mr. Hull's views.

The plausibility of Mr. Hull's suggestion must be admitted, and the adoption of it would, no doubt, remove many of the difficulties which the different temperatures met with at different places have given rise to. With regard to the increasing difference between the temperature in the open shaft and in the stratum around it, an explanation is not so easy to find, unless, indeed, it be assumed that there is necessarily a certain amount of natural ventilation in the open shaft tending to cool it—an influence which, of course, would not be felt in the solid rock. The whole subject is highly interesting, and it is to be hoped that Mr. Hull's paper will revive the discussion of it.—*Feb. 8.* GNOME.

NEW ZEALAND QUARTZ CRUSHING AND GOLD MINING COMPANY.

SIR,—In the Journal of last Saturday a correspondent, who signs himself "A Shareholder," writes in real, or probably in affected, ignorance of the prudent and energetic measures taken by this company to secure an early dividend; and in his transparent desire to run down the "new and improved machinery of one of the directors," he does not hesitate to do all he can to injure the company by throwing a wet blanket upon the hopes and prospects of those who have actually bought and paid for their shares in the undertaking, and who most assuredly will not thank him for depreciating the value of those shares in the market. Such a reckless disregard for the interest of others leads us to the somewhat natural conclusion that this very *zealous* "Shareholder" has become possessed of his shares *on very easy terms.*

In justice to the directors, whose conduct he has so unjustly impugned, as well as in justice to the *bona fide* shareholders, whose property he has so wrongfully depreciated, you will, I am sure, allow me to state the real facts of the case, which I will do as briefly as possible. The company was started in the early part of 1869, but it was not until the fact had been advertised far and wide that Mr. Wray had joined the board of direction, and had agreed to supply his powerful machinery, to be paid for in shares of the company when delivered, that the public came forward and bought up the shares. This floated the company so successfully that the secretary was compelled to advertise in the papers that no more shares could be obtained.

Finding that the "new and improved machinery" (to crush, pulverise, and amalgamate 100 tons in 24 hours) would require longer time to perfect than was at first contemplated, the directors bought and sent out two large steam-engines and two boilers, two sets of stamps (each of sixteen heads), with all the necessary adjuncts to work these two sets; together, also, with about 3½ miles of wire tramway, &c., to convey ore to the two mills. These (with a most efficient staff, &c.), have already arrived in New Zealand, and must now be on the gold fields of the Thames district, and be in course of erection, as the manager and the chief mining engineer had previously arrived by the overland route, in order to select eligible sites, and prepare materials for erection. It will be seen, therefore, that the directors, with a prudent resolve to save time, and to be on the safe side, have really placed upon the gold fields two sets of "the good old-fashioned machinery," which will, no doubt, speedily earn handsome dividends for the shareholders; but in doing thus much, these impugned directors considered it both honourable and prudent to respect the legal contract they had entered into for the "new and improved machinery," which up to the present moment has not cost the company one penny.

"A Shareholder," to indulge his private feelings, may possibly wish to goad on the directors, and plunge the company into a Chancery suit, which may swallow up all hopes of dividends, and send the shares down to nothing in the market. If this be his desire, we may be sure that the great body of shareholders will vote him an unsafe adviser, and refuse to follow his counsel. The directors, guided by prudence and good faith, are more likely to wait awhile longer, and see what the new machinery can actually do.

I have seen its working, and am convinced that when erected in New Zealand, this company will possess the most valuable machinery in existence for their purposes. I am not alone in this opinion, far from it, for mining engineers of the greatest experience in Cornwall, in Brazil, in Mexico, in Peru, in California, in Nevada, in Australasia, &c., have distinctly declared, both verbally and in writing, their wonder and astonishment at its performance.

American mining men, of the highest standing, have declared to me that it will create the most perfect revolution in gold and silver mining in California and Nevada, and will enable mines there to be worked at a great profit, which by the "good old-fashioned machinery" now in use, would entail heavy loss.

My own long experience enables me to confirm this view, and, to say further, that with such "improved machinery," and with prudent management, the New Zealand Quartz Crushing and Gold Mining Company cannot fail to pay such dividends as will more than satisfy every reasonable shareholder.

London, Feb. 9. AN OLD GOLD MINER.

MINING IN NORTH WALES—THE PWLLHELLI DISTRICT.

SIR,—I noticed in last week's Journal my name alluded to in connection with the above-mentioned mining district, and also in reference to a letter which appeared some weeks back, headed "Impressions on a Recent Visit to the Van Mine;" and the writer, who signs himself "Miner," states likewise that the shareholders of the Van Mine must have experienced great pleasure in perusing it. I am requested by "Miner" to give some information in the *Mining Journal* on the Pwllhelli lead mines.

In writing the letter in reference to the Van Mine, I beg to inform "Miner" that I did so independently of any pleasure it might cause the directors or shareholders, and not only with a perfect satisfaction to myself in consequence of the pleasure it afforded me, but principally because I was then, and I am still, in a perfectly free position to write in your Journal in reference to the Van or its district, never having possessed any interest in any of its mines. Therefore, I beg to inform "Miner" that I do not occupy the same free position as regards the Pwllhelli district (having lately purchased a mining property there)—that of giving an opinion publicly that could be regarded as thoroughly disinterested, as I trust was the case when I wrote my impressions on the Van Mine. I am sorry I cannot gratify "Miner's" wishes, but I shall be glad to give him, or any other persons who may desire it, any information on the subject by addressing me here, or next week, on my return to London, 26, Westbourne-park-terrace.

Pwllhelli, North Wales, Feb. 9. HENRY SEWELL.

MINING IN CARDIGANSHIRE.

SIR,—Surely there are few districts of equal extent in the United Kingdom where so many bright prospects of securing a more than ordinary return for capital than can be guaranteed, almost to a certainty, by a judicious investment in the mines of this highly favoured county. It is a fallacy to suppose that those mines which for so many years have yielded rich rewards to their fortunate supporters, comprehend the whole of the valuable treasures of our district, for our daily experience teaches us that, humanly speaking, there is no limit to the stores of wealth laid up in our hills for the capitalist from afar, and for the willing sons of toil in this their native land. Several of your correspondents have written lately of the brightening prospects of many of our old mines, and have drawn attention to many of the new speculations; and while we heartily wish continued success to the old mines, let us encourage, as far as possible, those who endeavour to open up new sources of employment, for surely if credit and reward be due to him who causes two blades of grass to grow where one only was wont to grow, those who strive to open up the hidden treasures of the earth for the benefit of their fellow-man are equal benefactors. But is it not our lot, and the business for which we were created, every man in his own order, to carry out the economy of the Omnipotent designer of all things?

Well, Sir, I am wandering into a train of thought, unintended at first. I wanted to write a few words of the bright prospects of the BWLCH CONSOLS MINE. It is pretty well understood, locally, that this property is opening out in a most satisfactory manner on the south lode, which alone yields the ore from which they are paying profits, but it may not be so generally known that the old Bwlch lode, from which all the former riches were produced, remains unwrought to the north, and towards which they are now cross-cutting. In a few months this new feature will be opened, in entirely new ground, whole (I believe I am right in saying) to the surface, and parallel to the present productive ground. And when it is known that the workings on this lode in Bwlch are not so deep as the Goginan adit by some 30 fathoms or more, and that the Goginan people are raising their ore on the same lode, about the 100 fathom level, it makes this cross-cut operation in Bwlch a most important feature in the concern. There is the utmost confidence that such prospects will be laid open at this part of the property as will increase the value of the undertaking, perhaps, tenfold, and may I be there to see.—*Goginan, Feb. 9.* RICHARD WILLIAMS.

NANTEOS CONSOLS MINES.

SIR,—I observe from Capt. S. Trevethan's remarks upon these mines in last week's Journal that he is under the impression that I and my friends abandoned them. I beg to inform him and the public that I never abandoned them. In consequence of the Russian War the market for mining shares became very flat, and having a large interest in about fourteen lead mines in Wales, I sold Mr. Murchison a considerable number of shares in Nanteos and Penrhiw, and also in Thomas's United Mines, now called South Darren, but I never had any other but the highest opinion of both properties. We made profits in Nanteos and Penrhiw, and but for the expense in bringing on the deep adit, and hindrances, we should have made regular profits and dividends, as we shall now. The South Darren is now a good dividend mine, and likely to continue to be.—*Feb. 10.* THOMAS P. THOMAS.

VAN CONSOLS.

SIR,—I enclose a copy of an anonymous circular I received on Tuesday:—

"VAN CONSOLS.—This property consists of a sett formerly worked under the name of Bryntail—was abandoned about four years since, and sold to one of the promoters of the present company for 275*l.* At present nothing of any commercial value has been discovered. The present price of shares is, consequently, entirely dependent upon speculative excitement, which should be availed of by selling before it has subsided. Quotations about 3¼ per share—falling."

I am induced to ask the question, What does it mean? It surely cannot be that the writer of this circular has the interest of the shareholders in this company so much at heart as to induce him to incur this expense on their behalf;—or, am I right, Sir, in coming to the conclusion that Self was the motive power? Anyhow, I took the latter view, and kept my shares. Perhaps, Sir, if you will kindly insert this communication it may elicit a response from some quarter.

Southampton, Feb. 8. A WELL-WISHER TO VAN CONSOLS.

HAMMETT MINE.

SIR,—I have carefully perused Mr. Waddington's letter which appeared in last week's *Mining Journal.* It abounds in abuse, egotism, and equivocation, but studiously avoids answering the plain questions which I had put to him. Mr. Waddington informs the public that when he was a very young man his mining speculations were unfortunate, an assertion which can easily be credited; and it is open to question whether his knowledge of mining has proportionately increased with his lustres. He has supplied three lamentable instances of failure, but does not condescend to publish the names. Now, even the devoted friend and admirer of Sarah Gamp was bold enough to doubt the existence of Mrs. Harris. Still these mines may have been, and, as old age fondly returns to its first love, they are, perhaps at present, included in the "many legitimate and *bona fide* concerns which offer to the investor the inducement of great profits," respecting which all particulars can be obtained upon application to the immaculate mentor of capitalists at 48, Threadneedle-street.

I did not express any amazement at the size and magnitude, as he is pleased to term it, of the Hammett elvan course, as elvans are common enough in Cornwall, but at its unusual character; and having consulted several experienced authorities, who at least have arrived at the years of discretion, I must still express surprise that what they deem extraordinary should be so familiar to him, and at the same time compliment him upon his Spartan indifference to wealth, if, as he asserts, he is so practically acquainted with the resources of this district. His comparison of the elvans of the Royaltons is extremely unfortunate, as they offer no parallel, for, although possessing fibres of tin of sufficient size to tempt the public to subscribe capital for their development, I have yet to learn that any portion has contained tin disseminated throughout, such as is found at Hammett, and from which the principal returns are being made. The lowest assay of the blue portion of the elvan has produced 40 lbs. of tin to the ton of stuff, the returning expenses being only 2½ lbs. of tin to the ton of stuff. Mr. Waddington accuses me of "presuming my knowledge of this mine to be of a special character," and I have spared no trouble or expense to make it so before recommending the public to buy the shares. Unlike him, however, I am not egotistical enough to presume to advise the public to be guided by my opinion alone, but I think that the statements of such authorities as Capt. Josiah Hitchins, of Devon Great Consols; Capt. Edmund Rogers, of Wheal Agar; Capt. W. Rowe, of Wheal Seton; Capt. James Seccombe, and Capt. Bennetts, will receive more credence from investors than the mere uncorroborated assertions of Mr. Waddington.

It would occupy too much of your valuable space to publish all the reports (*extenso*, but in contradiction of his assertion that there is not a remunerative quantity of tin in the Hammett Mine, I, with all humility, make a few extracts. Capts. Rowe and Rogers state—"The amount of profit will depend entirely on the number of stamp heads employed—the greater the number the better will be the result. The wheel already erected is quite powerful enough to work 36 heads; and, having a never-failing river of clear water, sufficient to work any and every kind of machinery necessary, we advise that at least 36 additional heads be erected as soon as possible, making together 72 heads, or more would be better still; for it is our opinion, judging from the samples carefully taken and assayed, and seeing that the deepest point of the stope is equally, if not more, productive than it is nearer the surface, that there is almost, if not quite, an inexhaustible amount of ground within easy reach that will well pay for working. The stuff is quite free from iron, &c., which renders it exceedingly easy and inexpensive for dressing, and it requires no burning; in fact, the whole cost of breaking, stamping, and dressing will not exceed 2*s.* 6*d.* per ton." Capt. Josiah Hitchins states—"There will only be required a few plain explanatory particulars for bringing under consideration the state, prospects, and value of this mine; but they will, I think, be clearly seen to point to sure and early success, which may be said to have been already partly realised, taking into account the quantity of tin raised, and the comparatively little as yet done (although to be considered a great deal for a mine of not more than six months' working). The workings commence on the large tin elvan formation, and are open from the very surface, consisting of breast stopes. There are laces or fibres of tin from 1-16th to ⅛th, and ¼ in. in width, of the richest quality, which, with the ore that it more or less produces throughout, will leave a good surplus after defraying all charges of breaking, stamping, dressing, agencies, management, and royalty.

The amount of profit will depend on the force of stamping power, and in a proportionate ratio with the most extensive scale of operation will the highest percentage be realised. About 30 fms. south of these workings is another elvan of a similar formation. The tin ore is of such a character as to be exempt from the expense of calcining, being free from mundic, iron, and all other deteriorating "brood," and, therefore, it will always command the highest price. Looking at the great quantity of ore that this large elvan will produce, together with the inexpensive way in which it can be brought into a fit state to be turned into cash (being worth 70*l.* per ton at the present price of tin), I consider it more than probable that with the before-mentioned stamping power only, there will be a profit of 350*l.* a month, if not more. Looking at the very encouraging state

and prospects of this mine, &c., I cannot avoid the conclusion that it is a very valuable investment." At the time of Capt. Hitchins's visit there were 24 heads of stamps at work, and 12 more heads nearly completed, which are now in full work. Mr. Waddington's assertions are a stigma on the character of the gentlemen who have reported upon this mine, but as they are some of our best and most trusted authorities, I must leave the public to form their own opinion. I can only conclude that the truth is not in him. W. MARLBOROUGH.

1, *Great St. Helens, E.C.*

[ADVERTISEMENT.]

VIRTUOUS LADY MINE.

SIR,—I shall not condescend to further notice the mean, paltry attacks made upon this mine of mines. The property is owned by 141 shareholders, and I invite one and all to come and see for themselves, or employ any agent to do so for them, and publish their reports in the Journal. Another water-wheel has been purchased, and paid for, which will be erected at once, with the crushing-machine. Several thousand feet of patent roofing-felt have also been ordered, and three dress-floors in connection with three different shafts are to be at once put up, and extensively laid out, when our present employment of eight or nine dressing hands will be increased to nearer 100. Both friends and foes have only to wait a few weeks longer, when the mine will pour forth its own astounding tale—volume after volume, founded upon sterling facts, and so prove to the world the correctness of the assertions and predictions of the faithful secretary.—5, *Abbey Mead, Tavistock, Feb.* 10. THOMAS J. BARNARD.

P.S.—I have no desire to go into personalities, but a private correspondent writes me this week that in November last he sent to a London broker, through an advertisement in the Journal, 10*l.* for five shares in this mine, and can neither get the shares or his 10*l.* returned: I really cannot advise him. It is only a week or two since that another correspondent asked my advice respecting 50*l.* that he had lost in the same manner. A writ was procured, but never served upon the broker, as he could not be found. Now, I have no objection to the advertising price system, if the advertisements are genuine, but I think a greater swindle, and one calculated to do immense harm to the mining world generally could not be enacted; and this very broker, with his clique, have been the parties who have done their utmost to run down and damage the mine.

[For remainder of Original Correspondence, see this day's Journal.]

OUR DOMESTIC FIRE-PLACES.

Although the domestic hearth is admitted to be highly attractive to Englishmen, only those who have read Mr. FREDERICK EDWARDS' book* are likely to think how much that is interesting can be written on our domestic fire-places, taking the words in their literal sense. In undertaking to discuss the various matters connected with the domestic use of fuel, Mr. Edwards has doubtless chosen a subject which concerns everybody, and as he has treated it well and thoroughly it will certainly prove useful as well as interesting. Commencing with a sketch of much relating to the history of the fire-place, he proceeds to detail the progress made in this country during the present century; to describe the various improvements which are possible in the present or may become practicable in the future; and to suggest means for effectually warming the halls and other portions of dwellings now in a great measure disregarded.

The author suggest that we may surmise that man once existed without the knowledge of fire, that he gradually became familiar with it, that his early curiosity with respect to it rapidly gave way to fear, and that it was dreaded and revered possibly for many ages before it was made to answer any convenience of life. Tracing the history from the earliest probability of fire on the ground or on heaped stones, Mr. Edwards leads his readers to the consideration of the tripod, the brazier, and other modes of burning fuel openly in the apartment; and with reference to the brazier, he remarks that even in our own country at as late a period as the end of the last century, before the introduction in England of the systems of heating by hot-water circulation and by close stoves, large areas, including the chambers of the House of Commons, were heated by charcoal or coke burned in the open brazier. The hypocaustum of the Romans was a notable advance upon this primitive system of warming. He observes that the chimney is serviceable in discharging smoke, but that we must remember that it is very *unserviceable* in discharging at the same time a great portion of the heat generated by combustion. He alludes to the now rapidly-vanishing implements of domestic economy—the bellows and the warming-pan. The gradual introduction of coal for domestic purposes naturally led to attempts being made to diminish the liability of fire-places to emit smoke by the contraction of the fire-place by a false brick back and brick sides, on the warranty of a gentleman from Ireland, who was "a great practiser of artificial conclusions," and he endeavoured to make the use of coal popular by making coal dust and loam into balls convenient for burning.

The advantages and disadvantages of the various fire-places which have been from time to time proposed are pointed out in a manner which proves at once the impartiality of the writer, and his thorough competence to instruct those who consult his volume. He has shown that the construction of fire-places has been reduced almost to a science, and that it is possible to makes stoves which combine ornament with utility, whether they be intended for the palace or the cottage. The volume is profusely illustrated with engravings of fire-places, which have been used from the earliest times to the present day, and should be read by all who are engaged in building dwellings, or annoyed by the imperfect arrangements for warming and ventilating those already erected. By studying Mr. Edwards's work the cause of annoyance will easily be found, and the means of removing it as readily ascertained.

* "Our Domestic Fire-places." New Edition, entirely re-written and enlarged the additions completing the author's contributions on the domestic use of fuel and on ventilation. By FREDERICK EDWARDS, jun. London: Longmans.

THE PRINCIPLES OF CARPENTRY.

The importance of careful attention to strictly scientific principles is undoubtedly great in all trades, but more especially so in those which, from their connection with the arts of construction, play a prominent part in securing safety to life and limb; and as it cannot be supposed that a workman can rely upon his own experience alone, the value of standard text books can scarcely be over estimated. Amongst books of this kind Tredgold's Elementary Principles of Carpentry has ever occupied a high position, particularly since the editing of the work has been in the hands of Mr. PETER BARLOW, F.R.S., and the issue of the fifth edition*, in a still more improved and enlarged form, will give satisfaction to a very large number of artizans who desire to raise themselves in their business, and who seek to do so by displaying a greater amount of knowledge and intelligence than their fellow-workmen. At the period of the first issue of the work Tredgold had to remark that the greater part of the works on carpentry were confined almost wholly to what is termed "finding the lines," but that the knowledge of practical and descriptive geometry is not the only part of science that a carpenter ought to acquire; for when it is considered that the art of carpentry is directed chiefly to the support of weight or pressure, it will be obvious that a considerable knowledge of the principles of mechanics is required to practise it with success. And it is not to carpenters alone that the study of the mechanical principles of carpentry should be confined, for in the modern practice of building it forms one of the most important departments of the science of construction. In the present state of society it is most desirable that stability and economy should be combined, and this can only be attained by a thorough knowledge of the materials used, and of the effects of the forces they have to contend against.

There is, perhaps, no class of the mechanical arts, says Tredgold with great truth, so directly capable of receiving improvement from the researches of men of science as those connected with building, neither is there any that have received a greater share of their attention, but these researches have not benefited practical men in proportion to the extent to which they have been made, as they are either given in works that are inaccessible to the bulk of men of business, or so completely scientific as to be almost useless to any but men of science themselves. Tredgold's object was to produce a treatise which, whilst strictly accurate in a scientific point of view, should be equally useful to the practical man of business. The appearance of such a work as that of Tredgold naturally excited the admiration of those who really desired to benefit the artizan class, and hence it was that when the second edition was in course of preparation the author received assistance and information from all quarters to facilitate the perfecting of the work. In its comparatively perfect form it was placed in the hands of the highly scientific editor, Mr. Peter Barlow, under whose direction the later editions have been issued, so that at present Tredgold's Carpentry is as complete a work as need be desired.

To the superior workman the volume will prove invaluable; it contains treatises written in language which he will readily comprehend, on the pressure and equilibrium of timber framing; the resistance of timber, and the construction of floors, centres, bridges, and roofs; uniting iron and stone with timber; methods of seasoning, and causes and prevention of decay; with descriptions of the kinds of woods used in buildings, &c.; all of which subjects might be profitably studied, not only by those engaged in domestic construction, but by mining mechanics, who, by applying the knowledge of the true principles of carpentry, which they might acquire from this volume alone, would be enabled to economise timber and time in almost innumerable ways, and thus make their own labour more valuable, and add to the profits of their employers.

* "Elementary Principles of Carpentry; with Practical Rules and Example, Essay on the Nature and Properties of Timber, and numerous Tables." By T. Tredgold, C.E. Fifth edition, corrected and considerably enlarged, with Appendix. By PETER BARLOW, F.R.S., &c. London: Lockwood and Co., Stationers' Hall-court.

CRUSHING AND AMALGAMATING.—The new crushing and grinding machinery invented by Mr. WRAY, of Ramsgate, is designed to do all that is necessary with the quartz from the time it is got from the vein until the precious metal is extracted, so that the complete system embraces several distinct machines. The crusher is a double-action machine of the stone-breaker class, having two mouths into which the quartz is fed either by men or by machinery adapted to that purpose. In practice the feeding platform will be on a level with the top of the mouths of the machine, and the carts or tram-wagons will "dump down" their loads of quartz on that platform, and as close as possible to the machine itself, so as to avoid handling. Immediately beneath the crusher, and attached to it, are two vertically corrugated rollers, which are worked by two short bands from the shaft of the crusher so as, in fact, to constitute it one machine. The compound vibrating sifting machine, which receives the crushed stuff consists of a series of sieves of different degrees of fineness terminating in a common shoot fitting into the feeding-box below. These sieves, which are each about 6 feet long, are actuated by two different motions, by which the action of manual power is closely imitated, and the sifting of the crushed material effected in the brief space of time allowed for its passage to the pulveriser. The sieves, as well as the corrugated rollers, are entirely boxed up in an enclosed chamber, so as to prevent any fine dust flying about the mill, choking the people and injuring the machinery. The pulverising and triturating machine is small but of great capacity for work, as it brings into operation from 6000 to 12,000 square feet of pulverising and triturating surface per minute, according to the speed at which it is worked. Attached to this machine, and forming part of it, is a feeding-box, containing inside a peculiar yet simple feeding board, which is caused to shake and vibrate rapidly, so as to deliver to the pulverising rollers the crushed material in one continuous thin sheet as fast as they require to be fed; in aid of which there is also inside a revolving brush, which may or may not be used, according to circumstances. From beneath the pulveriser there runs an endless travelling band, which may be carried away to any distance or to any desired elevation above the amalgamators, so as to avoid lifting by manual labour. The amalgamators are large wooden vessels, with steam jackets for keeping the mercury at a suitable temperature. In this vessel there rotates a series of corrugated discs, so that every portion of the quartz under treatment is brought into contact with the mercury. The inventor observes that the saving in one year on the single item of wages alone will possibly amount to as much as the actual cost of the machinery, whilst the general saving, by reason of the perfection of the whole process from beginning to end, will, he is convinced, be perfectly astounding. The finely pulverised and triturated material, when it reaches the amalgamating floors or level, is apportioned off to the different amalgamating machines, each in its turn, and by their action the precious metals are separated and secured. Mr. Wray does not think it possible to exaggerate the importance of these valuable amalgamating machines; they are the simplest, the handiest, the most secure, the strongest, the most enduring, the easiest worked, by far the cheapest, and immeasurably the most efficient of any machines ever invented for the purposes of amalgamation. Time and experience will prove the exact truth of this description. The machinery will speedily be tested on the large scale, as Mr. Wray has already made a set of the machinery for the New Zealand Quartz Crushing Company, of which he is a director, and he states that he has no hesitation in saying that it is the most efficient of any in the world, for what matters it, he asks, that we have the best machines for reducing our quartz to fine powder if after all our expense and labour we lose the precious metal contained by a stupid adoption of inefficient processes of amalgamation?

LIFE INSURANCE.

The subject of Life Insurance is one that demands more general attention and careful study than has been accorded to it even of late. Until the panic, caused by the breaking-up of one company and the rumoured difficulties of another, the public thought very little, and appeared to care even less, about the soundness of the position of the various companies in which their lives were insured. The questions were seldom asked—Are the principles upon which these existing corporations are founded sound or not? Are they, if sound, capable of improvement; and is the full proportion of the whole population insured which should make this necessary provision for their wives and families? So ignorant and indifferent were many persons upon this subject that if asked the name of the company in which they were insured they could not tell. They know only that Mr. Jones, Brown, or Robinson, the agent of some life office, suggested the desirability of their effecting an insurance, and that they acted upon his suggestion; that he reminds them when the premium upon their policy becomes due, and that they pay the amount to him with praiseworthy punctuality. They entertain the highest opinion of the agent, and they are satisfied with his *ipse dixit* that all is right. It is a happy circumstance for such persons that their confidence is, as a rule, well founded—and happier still are they in the fact that the great majority of our life offices are thoroughly sound, and well managed; but the condition of ignorance in which vast numbers of persons live upon subjects of deep personal interest to themselves is not creditable to the nation in this advanced period of the nineteenth century. Surely, every intelligent father of a family, whose income is dependent upon his personal exertions, and ceases with his life, would be wise to ascertain whether there exists a means by which he may make a provision for his family in the event of his decease; or, again, a single man would do well to consider whether (now that he is in receipt of a good income) it would not be desirable to enter into some arrangement by which as years advance upon him he might retire upon an assured moderate competency; and both married and unmarried alike are interested in making the best possible arrangements which circumstances admit of. It may be deemed a good plan to accumulate the yearly or half-yearly savings, and invest them in some good security; but here two difficulties present themselves—first, the best class of securities pay such a small amount of interest that the accumulation would be very slow; and, secondly, should death unexpectedly put a stop to the power of making a provision for the family, they would be left, as alas! too many are, in a state of sorrowful destitution. Life insurance seems to offer just the provision to meet the case. A comparatively small annual payment insures a sum sufficient after his death for the support of those who during his lifetime were dependent upon the exertions of the bread-winner of the family; but here, again, difficulties meet the intending insurant. Look where he may, at every turn advertisements of insurance offices meet his eye. Each vies with the other in offering its own especial attractions, and it is hard to know out of so many that are really excellent, and so many more that make such loud professions of possessing superior claims upon the attention of the insuring public, which to choose. The excellence of many of our insurance offices has resulted not from the soundness of the fundamental principles upon which they are based, but upon the excellent management of their boards of direction. So long as a board of highly intelligent, sound, and honourable men of business conducts the affairs of an office all will go well. It matters not how unlimited the powers of the directors may be—their probity, honour, and sound good sense prevent their investing the funds entrusted to their care in South Sea bubbles, and there is no danger of a misappropriation of the premiums to other purposes than those for which they were destined; but the case is materially altered if at any future period a speculative element should be introduced into the board. The steady old hands which guided the helm for years, and steered the vessel through rocks and shoals, to the honour and profit of her owners, may pass away, and their place be filled by young hands, more eager to grasp at large profits than to secure what they already possess. Experience has taught, and never more loudly than of late years, that such a course is fraught with certain ruin. With these facts before them the British Imperial Life Assurance Corporation, which was founded some three or four years ago at Manchester, having branch offices in London and elsewhere, sought to introduce such a system to public notice as should at once command sympathy and support. In this endeavour the promoters were ably seconded by Dr. FARR, F.R.S., of the General Register Office, Somerset House, who put at their disposal a plan devised by himself, which ensures—

1.—*Unexampled Security.* Four-fifths of all premiums being invested by trustees for the insurants *in the Government funds.*

2.—*Fixed Surrender Value.* About *one-half* of the net premiums paid can be had at any time, *on demand*, by insurants desirous of ceasing premium paying. The "Surrender Value" for each year is endorsed on the policy.

3.—*Banking Account.* Nearly 50 per cent. of the amount paid can be obtained for temporary purposes, at any moment, without sacrificing the policy.

4.—*Self Insurance; or Policies Payable during Life on a greatly-improved plan.* From 50 to 70 per cent. of the amount paid can be obtained at any time, either as the "Surrender Value" of, or as a loan upon, the policy.

5.—*No Lapsed Policies*, as the banking account cannot be forfeited.

Thus, it will be observed that 80 per cent. of the premiums is invested in the Government Funds, and, by the terms of the Trust Deed of the Corporation, can be invested in no other security. The directors have no power over this fund, which is held by trustees for the benefit of insurants. The remaining 20 per cent. is appropriated for working expenses, profits, and the formation of a guarantee fund under the control of the directors. A large share capital has already been subscribed, which affords additional security to the institution, based, as it is expressed in a pamphlet issued by the corporation, not upon the solvency of a fluctuating body of shareholders solely—not even upon the position, respectability, or good faith of a board of directors, subject constantly to change, but upon the known possession of Government stock of a sufficient amount to provide for all liabilities—which sum is held in trust, and cannot be used or made liable for any other purpose than that of meeting policy claims. Nothing but absolute national bankruptcy can shake such a security.

The second point, "Fixed Surrender Value" is of the greatest importance. The question has never until now been practically disposed of. It has always been admitted that an insurant had a claim upon a certain moiety of his paid premiums, provided he found it inconvenient to keep up his policy. That is, that if he chose to surrender his policy to the insurance company, and thereby cancel the obligation to pay the sum stipulated at his death, the company, on their part, should return to the insurant a certain portion of the premiums paid. This portion is technically known as the "office value" Now, this "office value" expresses always an indefinite, often an unknown quantity—and cases are on record of persons having paid their premiums for a period of eight or ten years, and for longer periods still, who have been told when anxious to surrender their policies that the office value was *nil*. Under the British Imperial system—we quote from the pamphlet already referred to—the surrender value is fixed, and commences from the moment the insurance is effected. Beyond this, the sum withdrawable each year (in amount about *one-half* of the Government stock held on its behalf) *is endorsed on the policy*, and is calculated from a "Policy Valuation Table," published in the general prospectus, and incorporated with the Deed of Trust. By this means each insurer can ascertain at any moment the value of his policy at that time, and can obtain the full amount to which he is entitled, by simply forwarding his policy with the last renewal receipt to either of the offices of the corporation. In like manner the same amount may be claimed, not as a favour, but as a right—in the form of a temporary loan. At the convenience of the insured the amount thus withdrawn may be repaid; but in the event of its not being returned, provided the payment of the premiums is continued, the policy is not forfeited—the only difference being that when the death of the insured occurs the sum borrowed will be deducted from the amount named in the policy. A life insurance company founded upon the foregoing principles is certain of receiving general support—and albeit the British Imperial Corporation (Limited) was brought out during a period of universal distrust and panic, it has flourished almost beyond the sanguine expectations of its promoters. The trustees and directors are gentlemen of established wealth and position, and we venture to predict that it has before it a career of great magnitude—of extended usefulness—and that it will occupy ere long a very prominent position among similar institutions in this country.

FOREIGN MINES.

CHONTALES (Gold and Silver).—The directors have a letter from Mr. Belt, *via* New York, dated Jan. 8. Remittance of gold, 267 ozs.; produce for the month of December, 198 ozs.; cost, 450*l.* The remittance would have been greater but for the excessive rains impeding the works at the mines, and the stopes in San Antonio not yielding quite so well as Mr. Belt anticipated, notwithstanding which the month of December yielded a profit, and Mr. Belt states this would have been larger but for the causes referred to. Mr. Belt is extending his operations at the San Antonio Mine, and has commenced to open out the Trinidad Mine, from which he hopes to obtain fair results with as little cost as possible.

NEVADA (Land and Mining).—J. J. Dunne, Reno, Jan. 16: Produce since last advice about $5000 bullion—it is in bars, but not yet assayed—making the total product about $37,000, to which there is a few hundred dollars to be added, which will be out to-morrow, and is of ore milled up to Jan. 1. The reason of the amalgamation being so far behind the crushing and roasting is that they have not been working all the pans, and have been making changes in them—lining them with wood, to prevent the iron being destroyed, and to give finer bullion.

CAPE (Copper).—The directors have despatches to Dec. 25. The mining reports are, as usual, reserved for the following mail, but the superintendent remarks on the continued improvement at Spectakel, and writes of that mine—"We shall most probably sample some 150 tons of ore of high value this month." The tramway progresses favourably. The Lynwood had arrived on the coast. Bills of lading are received for 55 tons per present steamer: 810 tons were sold on Feb. 1 by public ticket, at an average of 13*s.* 2¼*d.* per unit.

NEW WILDBERG.—J. Sanders, Feb. 4: East Mine: In the drivage east of the Erbstollen stones of ore are met with occasionally, but nothing to value has been met with as yet.—Carter's Shaft: In the 70 lachter level there is no change to notice in the drivage and stopes on the Erbtiefstergang Erzkammer, the average yield being 1¼ ton of ore per cubic lachter. In the forebreast of Conder's drivage at the same level there is a branch about 4 in. thick, composed of schiefer and a mixture of copper ore, which we intend to follow for a few lachters, hoping it may lead to something better. In the 60 lachter level the rise and stopes above the level towards Johanne's sink are yielding the usual quantity of ore, 1 ton per cubic lachter, and the stope east of Michael's shaft is also yielding 1 ton per lachter. In the 50 lachter level the stopes above the level on the Dornergang Erzkammer are yielding on an average 1 ton and the tribute pitch at the Gotteshülfe 1¼ ton per lachter.—Beck's Workings: There is nothing new to remark on in this part of the mine during the past week.—Blumengang: There is no change to notice in this part of the mine. The stope above the 70 is yielding 2 tons and the stope above the 60 is yielding 1¼ ton per lachter. We have commenced a drivage from the winze between the 60 and 70, and we expect by driving about 2 lachters to meet with the same shoot of ore we are now working on in the back of the 70.—West Blumengang: We are still pumping the water from this place as fast as we can; the workings are very long and wide, and there is a great quantity to be pumped out. All the machinery is in good order and working well. The dressing is being pushed on as fast as the weather will permit, and we hope to sample about the middle of next week.

VAL ANTIGORIA.—T. Roberts, Feb. 4: The principal of our forces are yet engaged on work connected with the new hoisting gear for the incline winze on No. 2 lode; the two ropes are just arrived at the mine, and we hope to have it nearly completed by the end of this month. During the past month we worked two mills twelve days, and put through 9½ tons of ore, which gave 1283 grammes of amalgam, which we estimate to yield when retorted and melted, on March 2, 10½ ozs. of gold. The stopes in back of the 30, on No. 1 lode, yield 1½ ton of ore per fathom; and the stopes in back of the 20, 2 tons per fathom.

PESTARENA UNITED (Gold).—T. Roberts, J. Mitchell, T. Warne, Feb. 3: During the month of January we amalgamated at Pestarena, with the small mills, 86 tons of ore, which yielded 65 ozs. 10 dwts. 16 grs. At Battigio establishment 169 tons of lower class ore from Pestarena, which gave 75 ozs. 13 dwts. 20 grs., and at Val Toppa establishment 328 tons, that yielded 271 ozs. 16 dwts. 22 grs., weighing together 413 ozs. 1 dwt. 10 grs. This gold was consigned yesterday to Signor G. Franzi.—Surface: The standing snow, with severe frost, continues to make against us in preparing ore for the mills, and other surface operations in general. At Val Toppa, the shoot from No. 3 to No. 4 level is nearly finished, and the railway laid on to the wire tramway station, which is under construction.—Mines: Val Toppa: The lode in the end driving south, above Marmo Rosso, yields 6 tons of ore per fathom, worth 8 dwts. of gold per ton. The cross-cut driving west from Marmo Rosso end north has intersected some branches of quartz, carrying pyrites. No change in the cross-cut east in this level. In No. 2 level, in the cross-cut east, we have reached a fissure in the rock corresponding with the one accompanying the productive lode at No. 3, and we shall expect to find it rich here also when it reaches the lode, which is only a few fathoms in advance of the cross-cut. The winze sinking under this level is yielding 8 tons per fathom, worth ½ oz. of gold per ton; and the end driving south 5 tons, worth ½ oz. per ton, and promises a further improvement. The stopes in the back of this level are yielding 10 tons per fathom, worth 1 oz. per ton; and the stopes in No. 3 level, on the side lode, yield 7 tons per fathom, worth 1 oz. per ton; and the rise 5 tons, worth ½ oz. of gold per ton. Nothing new in any of the cross-cuts at Nos. 4 and 5 levels.—Aquavite: The boundary stopes in the bottom of the deep adit we estimate now to yield 4 tons per fathom, worth 12 dwts. per ton. In this level we are driving on a part of the Aquavite lode standing in the side north of boundary winze; at present this end yields 3½ tons of ore per fathom, worth ½ oz. of gold per ton. We fully expect an improvement as we advance under the old workings under the shallow adit. The 23 end south has changed for the better, yielding stones of ore. We hope before long to be able to report a further improvement in this end. The stopes in the back of this level yield 4 tons per fathom, worth 1 oz. of gold per ton. The stopes in the bottom south, near whim-shaft, yield 5 tons, worth 17 dwts. per ton. The 23 end north yields 6 tons per fathom, worth 10 dwts. per ton; and the stopes in the bottom 5 tons, worth 16 dwts. per ton. The 33 end south continues to open up stoping ground. The principal stopes in the back of this level are the same as last reported. The men have been engaged in rising to communicate to a sink in the bottom of the 23 for air; this will be holed this month. The winze in the bottom of the 33 yields 4 tons of ½-oz. ore per fathom. The lode in the 46 end south is widening out according to expectation, yielding 6 tons of ½-oz. ore per fathom. We expect shortly to reach the third shoot of ore in this end. The stopes in the bottom of this level yield 6 tons per fathom, worth 1½ oz. per ton; these are now down 18 metres under the level. The lode going down is well defined, more so than it was in the 46.—Peschiera: The stopes in the bottom of the 33, on No. 5 lode, yield 3½ tons per fathom, worth 13 dwts. per ton. The stopes in the bottom of the 46 yield 6 tons per fathom, worth 15 dwts. per ton. The stopes in the back, 4 tons, at 10 dwts. per ton. The stopes in the bottom of the 70 yield 8 tons, worth 1½ oz. of gold per ton; and the stopes in the bottom of the 75, 3 tons per fathom, worth 1 oz. of gold per ton.

ALAMILLOS.—Feb. 2: In the 4th level, east of La Magdalena shaft, the ground is very hard for driving, and the lode small and poor. The lode in the 5th level, east of above shaft, is larger than it was, and contains spots of ore. The 5th level, west of same shaft, yields ¾ ton of ore per fathom; the lode is strong, and of a kindly appearance. In the 6th level, east of Taylor's shaft, the men are put to cross-cut north, to intersect the north lode. The lode in the 6th level, west of Taylor's, is unproductive. The 5th level, west of Taylor's, produces ¾ ton per fathom; the lode has a kindly appearance, and opens tribute ground. The ground in the 4th level, west of San Adriano shaft, is hard, and the lode unproductive. The lode in the 2d level, east of Cox's shaft, is very large, with stones of lead. The 2d level, east of San Victor shaft, yields ½ ton per fm.; the ground is easy for driving, and opening out tribute ground. The cross-cut in the 2d level, west of San Victor shaft, has not yet reached the south lode. In the 3d level, east of Crosby's shaft, we have not yet reached the point of the lode on the east side of the cross-course. The lode in the 3d level, west of Crosby's cross-cut, lately very rich, is at present injured by some strong joints crossing the end.—Shafts and Winzes: Addis's shaft, sinking from surface, produces 2 tons of ore per fathom; this is going down in a compact and productive lode. Roa's winze, sinking below the 5th level, yields ¾ ton of ore per fathom; the lode is very wide and strong, with good stones of ore. In Ploz winze, sinking below the 2d level, there is a splendid lode, worth 3 tons of ore per fathom. The stopes yielded the full complement of mineral in the past month, and are looking much as usual at present, enabling us to estimate the raisings for February at 250 tons. The machinery and other surface works are going on very regularly.

[For remainder of Foreign Mines see to-day's Journal.]

The Royal School of Mines, Jermyn Street.

MR. WARINGTON SMYTH'S LECTURES.

[FROM NOTES BY OUR OWN REPORTER.]

LECTURE XXIV.—It will now be convenient (said Mr. SMYTH) to consider the division of the work underground comprised in the driving of levels or drifts. Whether we are dealing with the stratified deposits or mineral veins, a great proportion of the work must of necessity consist of openings, more or less horizontal, which are required first for the preparation of the ground, and then for winning the material. Very little in the earlier operations of a mine can be done without driving narrow openings, from which no great amount of valuable mineral is to be expected, but which are a necessary preliminary to getting the larger masses hereafter to be removed. These bear the names of levels or drifts in most of the English mines, and I see they have acquired the somewhat barbarous term of "drives" in California. These galleries vary in size and form, according to the nature of the rocks they are driven through, and partly according to the purposes for which they are intended. They may be divided under seven different heads:—

1.—Exploratory, or for merely temporary purposes, generally of small dimensions, although no general rule can be laid down for them in that respect. In the older workings they are often so small that a man must go double to walk through them. Sometimes when a couple of costeaning pits are put down an exploratory level will be driven between them, so narrow as to be only passed through by creeping or crawling. As a rule, this system is now discarded. It has been found that, besides inconvenience to the men, the disadvantage of small levels far outweigh any saving in their construction, particularly as regards ventilation. In Yorkshire, however, particularly in the Richmond mountain limestone district, there are yet in use what are called "dark drifts," and "hand levels," which are only 4 feet in height and 2½ or 3 feet in width, just giving room for a man to pass through in a constrained attitude, and, of course, with much fatigue and inconvenience, pushing before him a little wagon, called a "driving wagon."

2.—Ventilating drifts are also of a variable size. Occasionally they were formerly very small, and even smaller than the Yorkshire drifts, as being considered economical, although it was a poor economy to make drifts for the conveyance of air of too small a size. They were generally 2½ by 4 or 8 feet; in stratified deposits it was more usual to have the ventilating drifts made of the same size as the principal working roads of the mine. In Staffordshire, for instance, where there are enormous seams of coal, 30 or 40 feet in breadth, the ordinary travelling roads are 7 to 8 feet in height. Where a separate opening is cut, as the air lead, there is danger if small dimensions are adhered to when the top or sides are of a crumbling nature, that the ventilation will be rendered extremely feeble, by falls of material, besides rendering it difficult of travelling through to clear away the obstructions.

3.—Ordinary levels and roadways often depend on the width of the lode. They used generally to be between 3 and 4 feet high, and when visiters had the misfortune to be obliged to travel through the whole level they found it very painful to adapt themselves to such miserably small dimensions. They were, to be sure, shaped like a coffin, giving a little more room for a man's shoulders, and narrowed in at the feet, but when anyone was passing through the air could scarcely get by him. These were invariably the dimensions in the old mines, and could be traced back from the times of the Romans to the end of the last century. From that time an improvement began to set in, until at length they were made 5 or 6 feet in height, and from 2½ to 4 feet wide. During the last 80 years it had been sufficiently shown by the practice of all the better mines, both on the Continent and in this country, that it was best to have a clear height of 7 feet, and as large a width as from 4 to 5 feet. Even in those mines in Yorkshire with such small airways the main levels have a clear opening of this area; and if timber and stonework have to be put in, room should be left so that there should be a height of 7 feet and a width of 4 feet. In the Foxdale Mine, Isle of Man, where the lode is very variable, being sometimes large and sometimes almost invisible, and where very strong timbering has to be put in, the dimensions kept up are 7 feet by 5 feet.

4.—Adits for conveying water into the mines ought to be carried at a moderate downward inclination.

5.—Drainage adits, or levels, are very similar to the galleries described, but it is seldom necessary to resort to the larger dimensions. It is, however, of the greatest importance to the health and comfort of the miner that a good water channel should be established. Too frequently the drainage is allowed to run along the bottom of the roadway, and the men have to walk through it. The water very often is exceedingly cold, and the men who have to do this are much troubled with rheumatism. If the mine be one in which there is a large quantity of water it is necessary to make the adits 8 feet high, so as to have a floor, and leave the men room to walk. It is sometimes necessary to make the adits of such proportions as to allow for the passage also of air currents. In the coal districts these adits are made so small as to be mere "soughs," but in metalliferous mines that could not always be done.

6.—Adits intended to unwater large districts, comprising many square miles, and to receive the waters of several mines, must be made 9 or 10 feet in height, and of proportionate breadth.

7.—Canals are comparatively rare; but some enormous works of this nature were carried out at the end of the last century by the Duke of Bridgewater, on whose canals boats of large size bring the contents of the mines from the dark bowels of the earth into the daylight.

There are many points in driving levels to be carefully attended to by the mine manager. Supposing we have put down a pit to the bottom of the bed to be worked, and drive out longitudinally, the line must deviate as little as possible from true horizontality. The necessity of securing the drainage will compel you to provide some amount of fall to carry the water to the bottom of the shaft, whence it may be pumped out, but if you are working on the vein the longer the level the more you will lose. In fact, the question of what is a level has before now had to be solved by judges and juries, and serious complications have turned upon it. That a level cannot be driven with perfect horizontality is a mining axiom, and the point for the manager is how much is he to lose. If it be intended for a road-way in the stratified deposits, for the purpose of bringing out large quantities of mineral, besides allowing the water to flow out freely, and giving the horses some advantage in drawing the full wagons, about three-sixteenths of an inch in a yard, which will come to 1 foot in 192 feet, will be a good gradient. Now, take the case of a metalliferous mine, when you drive into the side of a hill to intercept the lode you must carry your level so as to meet it at the lowest point, and get as much as possible; 1 in 300 is not an unfrequent gradient; and if it has to be carried a long distance 1 in 480 has been found to be enough in a particular case in Hungary, where there is the nearest approach to horizontality which has been achieved anywhere. Another point of importance, in which the same principle comes into play, is when the boundary between two properties is a line drawn between two points. It is sometimes, however, absolutely necessary to make the rise greater than the gradient I have mentioned; as, for instance, when the floor is soft, and the water does not run off quickly. Again, obstacles often interpose from irregularity in the contour of the beds, and it may be necessary to deviate from the straight line to cut off corners or to pass obstructions.

In constructing adit levels it is highly important that they should be placed where they have an absolute security from being flooded at the "mundloch," or mouth. If the mouth is placed near the sea, so as to be submerged by unusually high tides, or a river likely to be swollen, the most disastrous results might follow. The water running back along the adit level would come to the shafts which pass through it, and the lower workings and all that were in them would be drowned. When, however, this risk has to be run the danger is met by flap-doors, which close against and resist any return of the water. Adit levels, however, should be placed so as to be secure from anything of the kind. The adit is also called the water level, but it is often used for other purposes besides that of drainage. The terms by which it is designated are rather various in foreign countries. In French it is "gullvien," in North Germany "gang-streeke," and in South Germany "gang-lauf." When galleries are carried across from one level to another—a frequent and constant necessity, even if through dead ground—our English miners call it a "cross-cut." The terms crut, or cut-out, or a branch tunnel, or a stone drift, are all synonymous with cross-cut. The Germans call it "querschlag," but when they come to be inclined, various other names are used.

After the first setting of the ground for levels to the men by tutwork the manager will have to look constantly to various points, as it would never answer to leave the men to work it out by themselves. The bargain should be so arranged as to make it the decided interest of the men to advance rapidly, but they will want frequent supervision. Their dimensions must be kept at their proper proportions, for if they are opened out too large the cost of supporting the roofs will be greater than expected; and if too small, there will not be sufficient room for the passage of the wagons. Therefore, having fixed on the proper size, it should be adhered to. Care must also be taken that the rise of the level does not advance too rapidly, and the men, as it is termed, "lose level." This is so serious a fault that it cannot be detected too soon, and the men must be made to come back and take up the sole before they are paid for the month's labour. This requires constant attention, for the men coming to a place where the ground cuts more easy on the rise have a natural tendency to choose the line of softest ground. Moreover, if there be a tendency to accumulate water, they naturally like to keep out of it as much as possible, and so the floor, or sole, rises higher and higher. Levels, as I have already intimated, should be driven as straight as possible, if they are to make good roadways afterwards.

Of this class of work long levels to unwater entire districts, are of the greatest utility, although they used to be more important than they now are. Before the introduction of the powerful steam-engines of these days it was often impossible to deal with large bodies of water in mines otherwise than by carrying in drifts from the neighbouring valleys. Better examples of these cannot be found than those of the Schemnitz district, in Hungary, driven in the last century, where the waters from the mines of a whole district are pumped up to the great Joseph adit (so called after the Emperor Joseph), instead of to the surface. There are many magnificent works of this kind on the Continent, and it is by no means an unknown thing in England. In Derbyshire, where they are called "soughs," they are managed mostly by a company undertaking to construct an adit for a certain district, and then all the mines benefitted pay a royalty on the mineral raised from below the level of the adit, or sough. In Derbyshire, however, these soughs are seldom driven for any great distance. In the North of England one of the most striking works of drainage at the present moment is to be found on the property of Mr. Beaumont, M.P. for Northumberland, that gentleman having undertaken to construct an adit level 6¼ miles in length, with four intermediate shafts, to unwater his mines. Of course the shafts, like those of a railway tunnel, are sunk to expedite the work, and so start it from several points at once, going from the bottom each way, depending for accuracy of direction upon careful dialling, which, in this case, proved remarkably accurate. The deep adit of Schemnitz is carried under a mountain so high that it was out of the question to sink shafts, but on either side there are two—the Sigilsberg and the Zipser shafts—which are 1¾ mile distant from each other. This is greatly exceeded by the Mont Cenis Tunnel, which it is impossible to reach by a shaft from above, and which will be eight miles from end to end. The command of enormous sums of money, the employment of powerful machinery on a large scale, and the great size of the orifice, are advantages which materially assist in the possibility of undertakings of this sort. One of the most remarkable mining enterprises has been completed within the last two or three years by the Hanoverians, in the Harts, at Clausthal, already famous for the great adit named after our King George. In Cornwall they cannot get a great deal below the surface, the sea-level being only 40 feet lower than the land; but the great Gwennap adit is a remarkable work, and, with its branches, extends to about 30 miles.

The Clausthal adit, 18 miles long, was completed in an unusually short space of time—13 years. It was attacked at ten different points, and turned out an extremely good specimen of dialling. It is 3 ft. in height and 2 ft. in width, and its stone entrances are architecturally worthy of a great people. I was much struck with it when I visited it last summer. It cost 140,000*l.*, so that these works can only be carried on by the Government of a country, or a wealthy company. A very fine adit (of which a diagram was exhibited) has been constructed at Nevada, in California, to unwater the famous Comstock lode, which has produced enormous quantities of silver ore. Formerly a great number of steam-engines had to be employed, but there being the deep valley of the Carson river at a moderate distance an adit has been driven, which unwaters the lode to a great depth. Indeed, it is a wonder that the scheme was not thought of long ago, but the improvement has at last been attempted, and completed by this time. Its length is very small compared with the great works I have described, but its importance cannot be overrated, since it not only facilitates the working of a lode of great richness, but opens a probability of other rich lodes being intersected, there being a strong tendency in lodes to run in parallel lines.

SOUTH STAFFORDSHIRE AND EAST WORCESTERSHIRE INSTITUTE OF MINING ENGINEERS.

The third annual meeting of members was held at Dudley, on Monday, Mr. DAVID PEACOCK (President) in the chair.

Amongst the members present were—Messrs. North, Job Taylor, Latham, Bailey, Hill, Ness, Johnson (Hon. Sec.), Spruce, Greenway, Smallman, Waterfield, Rogers, Fellows, Hancox (Darlaston), Fisher, Meacham, B. R. Smith, Lindop, W. H. Hall, Blakemore, Mason, Evans, John Williams, Howl, Fisher, W. Spruce, T. Oakes, jun., Thomas Holcroft, Checkley, H. Johnson, jun., R. Latham, Petford, Ritson, E. Foley, J. Foley, Thos. Williams, J. Cole (Wren's Nest), Nicholls, Field, David Davis, D. W. Munro, A. H. Lindop, Williamson, B. Callear, W. B. Hayley, Hayward, John Hughes, Woolley, Roper, Elijah Davis, E. Terry, Isaiah Morgan, John Lawley.

The correspondence between the council and Mr. Henry Beckett, F.G.S. (President of the South Midland Institute of Mining, Civil, and Mechanical Engineers), was read. The Council disavowed unfriendly feeling toward the South Midland Institute, and stated that, on the contrary, they wished to cultivate the kindest feelings towards its members, trusting they would be reciprocated. The letters elicited no remarks from the meeting.

The report of the council for 1869 announced a considerable accession of new members, and a material increase in the funds; there is now a balance in favour of the Institute of 350*l.*, including arrears and subscriptions now due. There are 143 members, being an increase of nearly 50 per cent. since last annual meeting. The members have continued to meet monthly throughout the year at Dudley, Walsall, and Wolverhampton, and have profitably discussed scientific mining and mine management generally. Through the kindness of the members of the Iron trade of Middlesborough and the council of the North of England Institute of Mining Engineers, the council were enabled to arrange a four days' excursion to those two important districts in the month of June last. The blast-furnaces and iron works in and about Middlesborough were visited, and also the wonderful iron ore deposit of the Cleveland hills. The great Ryhope Colliery, near Sunderland, was also visited, and the extensive pumping arrangements at the Wallsend Colliery were also inspected. The council recommend similar excursions into other districts in the ensuing year. At the conclusion of the report the election of officers was proceeded with, and the offices were thus filled:—President, Mr. William North; Vice-President, Mr. Jas. Cooksey; treasurer, Mr. Thomas Latham; hon. sec., Mr. Henry Johnson; council, Messrs. David Peacock, S. Bailey, John Hill, and Walter Ness.

Mr. North, the newly-elected President, then took the chair. The newly-elected officers acknowledged the compliment of their election; thanks were voted to the retiring officers, and acknowledged; a special vote of thanks was given to Mr. Henry Johnson, the honorary secretary; and Mr. Peacock gave notice that at a future meeting he would propose a vote of 30*l.* per annum to some one to assist Mr. Johnson.

Messrs. Charles Camwell, M.E., Walsall; E. Terry, M.E., Dudley; G. B. Nicholls, surveyor, West Bromwich; Samuel Horton, surveyor, Wednesbury; Samuel Rowley, coalmaster, Tipton; John Brains, colliery manager, Bloxwich, were elected ordinary members; and Mr. John Jones, Secretary Middlesborough Iron Trade, Middlesborough, honorary member. The reading of the papers was then proceeded with.

OUR FUTURE COAL SUPPLY.

REMARKS ON PART OF THE COAL FIELD OF FIFE, N.B.

BY WALTER NESS, M.E., PELSALL.

The investigation of the Royal Commission happily assures us that there is enough coal in store for several generations to come. Referring to the coal field of Wemyss, he observed that from the town of Dysart to that of Leven, along the north shore of the Frith of Forth, we have a distance of 6 miles, and from where the tide recedes to, measuring inland, we have about 2 miles, or, in all, 12 square miles, equal to 7680 acres, at the thickest part of which we have 29 workable seams in about 3000 ft. depth, having an aggregate thickness of from 120 ft. to 130 feet. Let us take only 100 ft. as the aggregate thickness, and thus allow 20 ft. to 30 ft. for the coal already worked and cropped out. Then we have here 7680 acres, 100 ft. thick, at 1106 tons per foot per acre, equal to 844,000,000 tons. This quantity is equal to about the aggregate output of all the collieries in Great Britain for the last ten years. Taking a longitudinal section of the coast-line, we have presented a series of upthrow faults as we go eastward, and they are from 1500 to 1800 yards apart; but as the measures have a dip eastward these upthrows just bring the coal measures to a more convenient depth from surface, and they act very beneficially, for the areas between the faults are quite large enough for a plant capable of raising 500 to 1000 tons a day for a generation. The maximum output of the existing collieries in this field for the last ten years will not exceed 500,000 tons. Thus, allowing for a considerable increase in the output, there is here over 5000 years' supply at the present rate of withdrawal; this, at 1s. per ton profit, would give a total sum of 42,240,000*l.* The coals are of excellent quality, ranging from the best cannel or gas coals down to ordinary furnace coal, having all varieties of quality between. At present there is no shipping accommodation, otherwise the whole of the East and North of Scotland and Baltic ports would be their markets. Opposite to the estate of Wemyss, in a southerly direction, the Forth is about twelve miles wide, five miles of which we may take as belonging to the north side, or the Commissioners of Woods and Forests, the Forth being Crown lands. We have thus six miles along the coast line by five seawards, equal to 30 square miles. There is no practical hindrance to working this. The bed of the Forth is only about 150 ft. below the surface, and the water, and all the measures along the north coast, have a regular dip east by south, and from one in four to one in eight. Thus the thickness of superincumbent strata is increased, and as there is an identity established between the coal measures on the north and south sides of the Forth, no doubt the bed of the estuary is the basin of the coal field. This would be 2,112,000,000 tons; add to this the 844,000,000 tons on land on the Wemyss estate, and we have a quantity equal to the output of Great Britain for over the last 50 years. May not Wemyss yet become a large shipping port, and a busy, thriving seat of mining? Now, if we take the total area of the Forth, where we have reason to believe these coal measures exist in their entirety, and viewing the matter as having a decided national interest, we have about 180 square miles; and, using the same multiples as before, we get 12,672,000,000 tons. Taking the other parts of the nation in like manner available opposite Northumberland, Durham, and Yorkshire, and under the German Ocean, also opposite Ayrshire, Cumberland, Lancashire, and the Bristol Channel, on the West Coast, as jointly capable of yielding a similar quantity of coal to that of the Frith of Forth, we shall then have 25,344,000,000 tons. These remarks are confined to coal alone, the ironstones and other minerals being left to make good any doubtful part in the areas named.

ELECTRO-MAGNETIC LOCK FOR SAFETY-LAMPS.

BY MESSRS. CRAIG AND BIDDER.

The lamp referred to in this paper has already been described and illustrated in the *Mining Journal*. It was remarked that all the existing lamps could be altered to work on this principle at a small cost. The battery is an ordinary six-cell carbon battery, with plates 7 in. by 6 in., and the cost of the maintenance of this battery is about 25*s.* per annum. The sal ammoniac and black oxide of manganese battery, a recent French invention, and patented in this country, was tested lately, and found to be most suitable for opening the lamps, the cost being only half that of the carbon battery, and more lasting and powerful. No ordinary magnet that could be carried about would be of sufficient power to open this lamp. The lamps could be opened at the rate of 400 an hour by one battery, if required. The mode in which the electro-magnets are arranged was shown in a diagram. The plate in the lamp at the end of the bolt, by which the lamp was, in fact, the armature to be acted upon by the magnets. The electro-magnets are permanently fixed in the lamp cabin, so that the apparatus can be used with facility, and is beyond the reach of injury. The electro-magnets are wound round with No. 18 covered copper wire, and are arranged under a brass ring let into the lamp table. The royalty is 1s. each; and a Clanny of the last construction, and having this lock, may be purchased at 11s. 6d.

THE GREAT WESTERN BOUNDARY FAULT OF THE SOUTH STAFFORDSHIRE COAL FIELD.

BY MR. GEORGE SPRUCE, M.E., PENNETT.

This was a description of new sinkings and explorations made (under the direction of Mr. Wm. Spruce, the mine agent at the colliery, and Mr. George Spruce, his son) against the Great Western Boundary Fault of the South Staffordshire Coal Field at the Earl of Dudley's Nos. 3 and 7 Pits, Himley Colliery, and sections of the trial workings at Enville. The sections were drawn by Mr. J. Hughes. Their general character was described in the *Mining Journal* of July 3 and July 10, 1869. Two headings were shown, driven about 30 yards into the fault, the second situated about 300 yards from the first, and the fault had been stripped along that line. The Thick coal had, together with the Gubbin ironstone and the Heathen coal, with their attendant measures, cropped out in an upward direction. Here commenced the fault of Red Sandstone, or Permian rock. The Thick coal crops out in an entirely opposite direction, and between it and the Permian is to be found, in a vertical position, the measures found in a horizontal position in sinking the shafts—Mottle-ground, dark fire-clay, rock with blue parting, strong fire-clay with balls of ironstone, White Sandstone rock, strong fire-clay, blue limbs containing balls of ironstone, peldon, and various other measures usually found on the top of the Thick coal. All this was shown on one of the diagrams. In the other diagram there is every proof of denudation. Strata are seen in a vertical position. This, it is inferred, would be caused by a subsidence of the land drawing them down after the water had passed off.

The authors of the papers read and of the diagrams exhibited were warmly thanked.—Mr. BLAKEMORE, in proposing the vote, referred to his enquiries of last year as to the quantity of coal remaining ungotten in their own district in particular. He also spoke with especial satisfaction of the result of the enquiries which had been made by Mr. Ness. These were conclusive that our stores of coal were still very abundant.—Mr. LINDOP seconded the motion, and was glad to find young men like Mr. Latham and Mr. Spruce taking so much interest in their work as to have prepared the diagrams which hung upon the walls, and which they had both so well described.—Mr. JOB TAYLOR likewise encouraged young mining engineers to go on doing that which, though it might not bring them immediate money recompense, would in the end surely yield them professional advantage.

EXPLORATIONS CONNECTED WITH THE STAFFORDSHIRE THICK COAL.

BY MR. RICHARD LATHAM, M.E., DUDLEY.

This paper embraced a description of extensive explorations in the disturbed and altered Thick Coal under the Rowley Hills, at Earl Dudley's No. 26 Pit, Oakam, and was illustrated by a horizontal section, 30 ft. long. They have now a mile and a-half of workings open, and whilst much of it is very varied in its geological character, a great deal of green rock being found as hard as the Rowley Rag itself, still they had proved from 15 to 16 acres of as good Thick Coal as any in Staffordshire. Engines have been erected to get this coal up inclined planes because of the extraordinary inclinations at which it lies, and the spring-doors, of which Mr. Latham is the inventor, have been put up in these pits to mitigate any calamity which would ensue upon an explosion of gas. By one powerful spring being placed in the middle of the doors, instead of two less powerful at the sides, their efficiency has been increased.

THE COAL UNDER THE RED ROCK.

BY HENRY JOHNSON, M.E., DUDLEY.

The probable existence of the thick coal underneath the lower New Red Sandstone and Permian, between the supposed eastern boundary fault of the South Staffordshire coal field and Birmingham, has for many years formed an interesting subject for discussion amongst learned geologists, as well as of practical mining engineers. Sir Roderick Murchison, Profs. Ramsey, Smyth, Hull, the late Beete Jukes, and others have from time to time spoken and written much upon the subject, and all agree that it is probable that coal measures extend from West Bromwich underneath Birmingham, and join the Warwickshire coal field. Sir Roderick Murchison has spoken very strongly for many years as to the desirability of testing this unproved ground by a trial sinking in the neighbourhood of Sandwell or Handsworth. With this view, a concession of the whole of the Earl of Dartmouth's land in that neighbourhood, lying on the east side of the supposed boundary fault, comprising about 1700 acres, lying altogether in a ring fence, has been obtained, and it is proposed to sink a trial shaft. It is proposed to form a limited liability company, with a capital of 20,000*l.*, in 200 shares of 100*l.* each, one-third deposit on allotment of shares, and one-third in twelve months, and the remainder one-third in two years. As the expenditure to be made in the proof is limited to 16,000*l.*, and each share is limited to 100*l.*, there can be no further risk to those who choose to embark in it. It is impossible to say whether coal exists or not, but there are strong geological evidence that it does; and in the event of the Thick coal being discovered at the spot fixed upon, it would then prove one of the finest mining properties in the kingdom, considering the market, quantity, and other circumstances.

The lease comprises all the mines of coal, ironstone, fire-clay, common clay, marl, and sand under the whole of the Earl of Dartmouth's land, which lies connected together in the parishes of West Bromwich, Handsworth, Harborne, and Great Barr, and east of the fault, as proved in the Lewisham and Heath Collieries, comprising about 1700 acres. Royalties, "6d. per ton on all coal, lumps, slack, ironstone," and equally low rates upon other materials. Royalty to commence in 12 months after the actual proof of the existence of the workable mines. The depth would probably be about 350 yards, and from past experience in the neighbourhood it is confidently believed that the proof would be made for less than 16,000*l.*

Much interest was taken in Mr. Johnson's statements and explanations, and they were generally approved.—Mr. JOB TAYLOR entered heartily into the matter, but suggested that the shaft should be placed near to the centre of the estate. At that point more property would be proved, and the probabilities were that the coal would be reached at a much less depth.—Mr. JOHNSON defended the position chosen for the shaft because of the proximity of the means of communication with the leading markets.

This concluded the business of the meeting. The members afterwards dined together, and the whole proceedings were considered highly satisfactory.

THE CHEMISTRY OF THE MINE.—The valuable and interesting lectures upon this subject, delivered by Dr. ALFRED HILL, of Birmingham, to the members of the South Staffordshire and East Worcestershire Institute of Mining Engineers, abstracts of which have already been published in the *Mining Journal*, have now been issued in pamphlet form by the council of that society, and from the large amount of practically useful information they contain they should be thoughtfully read by all connected with collieries or colliery operations. Commencing with an outline of the chemical and physical properties of the elements concerned, Dr. Hill conducted his hearers to an ample knowledge of the nature and properties of fire-damp, and the several other mixed gases met with in the mine. Referring to combustion, he explained that Lavoisier, by whom the phlogistic theory was exploded, suggested that the light and heat of combustion are due to the latent heat of the oxygen, in the act of combining, becoming sensible. It is, however, well known that the latent heat of bodies is altogether insufficient to produce the amount of sensible heat developed during combustion. Berzelius attributed the heat and light to the union of the two opposite kinds of electricity which existed in two bodies before combination. This hypothesis, however, is not satisfactory. That most in favour is that of Davy, who regarded motion as the cause of heat and light, the mode of their production being analogous to that of light. On this view the great heat and light produced by friction, and in chemical combinations of an energetic and violent kind, are explicable and intelligible. In the second lecture Dr. Hill drew attention to the chemistry of the elements which enter into the constitution of coal and fire-damp—carbon, hydrogen, and sulphur; and in the third lecture he explained the nature and properties of fire-damp. He concluded by observing that in the mine habits of cleanliness should be cultivated, and proper and decent receptacles for excreta provided and used in the workings, and thus the purity of the air would be rendered the greater, and health materially promoted. The lectures were illustrated throughout with interesting and attractive experiments, and their utility were thus greatly enhanced. The pamphlet containing them is published at the Journal Office, Birmingham, and it is much to be hoped that every coalowner in the district will profit from the knowledge to be obtained from them.

MANCHESTER INSTITUTION OF ENGINEERS.—This institution, which was formed about three years since by some of the leading engineers of Manchester and the surrounding district, and which is now presided over by Mr. W. Hulse, M. Inst. C.E., has just issued the first and second parts of its Proceedings, which contain some very interesting matter. Besides the addresses of the presidents, there are valuable papers "On Shaw and Justice's Patent Dead-Stroke Power Hammer," by Mr. James Fletcher, jun.; "On Life-Boats, and their Appliances," by Mr. Joseph Corbett; "On Friction Brakes and Couplings," by Mr. F. A Weston; "On Patent Fuel," by Mr. T. W. Ommancy, and a number of interesting communications on the Irwell floods, which have from time to time given rise to much anxious discussion in Manchester and Salford. The Institution is gradually enlarging the scope of its operations, and Mr. W. Lloyd Wise, of the Adelphi, has recently undertaken to represent it in London as honorary local secretary. One of the latest meetings was held in the Mayor's parlour of the Manchester Town Hall, on Jan. 4, under the presidence of Mr. John Platt, M.P., when a most interesting and valuable paper on the Patent Laws, already referred to in the *Mining Journal*, was read by Mr. Theo. Aston, the eminent patent barrister. The meeting was a crowded one, and the reading of the paper was followed by a very interesting discussion. From the progress already made, the Manchester Institution of Engineers bids fair to become one of the most prominent and useful scientific societies of its kind, and we heartily commend its Transactions to the attention of our readers.

SOCIETY OF ENGINEERS.—At a meeting of members, held in the society's hall, on Monday, the report of the council and a statement of accounts and balance-sheet were submitted. The retiring President, Mr. F. W. Bryant, then presented the following premiums for papers read during the past year:—To Mr. E. G. Bartholomew, for his paper on Electric Telegraphy; to Mr. F. W. Hartley, for his paper upon the various methods employed in determining the Commercial Value and Purity of Coal Gas; to Mr. Perry F. Nursey, for his paper upon English and Continental Intercommunication; and to Mr. Vaughan Pendred, for his paper upon apparatus for measuring the Speed of Ships. The President for 1870, Mr. William Adams, then took the chair, and delivered the inaugural address.

A NEW STEAM POWER INDICATOR.—At a meeting of the Manchester Institution of Engineers (W. Hulse, president, in the chair), the secretary, Mr. W. E. Dando, read a paper (a communication from Messrs. Ashton and Storey) on a steam power meter, which stated, among other things, that one of these instruments was attached to a large direct acting pumping-engine employed in raising water from the Irwell into a branch of the Bridgewater Canal; the readings of the meter and stroke counter had been recorded daily since August, 1869, and the movements of the power meter carefully analysed; during that period numerous indicator diagrams had been taken, and the experiments in each case had occupied much time; and the result had been greatly in favour of the new invention, as supplying several important desiderata that had been hitherto felt in connection with the indicators and meters in common use. A lengthened discussion followed the reading of the paper. The proceedings terminated with a vote of thanks to Messrs. Ashton and Storey.

LONDON GENERAL OMNIBUS COMPANY.—The traffic receipts for the week ending Feb. 9 was 9263*l.* 4*s.* 1*d.*

London: Printed by RICHARD MIDDLETON, and published by HENRY ENGLISH (the proprietors), at their offices, 26, FLEET STREET, E.C., where all communications are requested to be addressed.—*Feb.* 12, 1870.